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Bypassing Health Providers:

The Quest for Better Price and Quality of Health Care in Chad

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Abstract

This paper investigates individuals' bypassing behavior in the health sector in Chad and the determinants of individuals' facility choice. The authors introduce a new way to measure bypassing using the patients' own knowledge of alternative health providers available to them instead of assuming that information as previously done. The authors analyze how perceived health care quality and prices impact patients' bypassing decisions. The analysis uses data from a Quantitative Service Delivery Survey in Chad's health sector carried out in 2004. The survey covers 281 primary health care centers and 1,801 patients. The matching of facility data and patient data allows the analysis to control for a wide range of important patient and facility characteristics, such as income, severity of illness, quality of health care, or price of services. The findings show that income inequalities translate into health service inequalities. There is evidence of two distinct types of bypassing activities in Chad: (1) patients from low-income households bypass high-quality facilities they cannot afford to go to low-quality facilities, and (2) rich individuals bypass low-quality facilities and aim for more expensive facilities that also offer a higher quality of care. These significant differences in patients' facility choices are observed across income groups as well as between rural and urban areas.

This paper—a product of the Human Development and Public Services Team, Development Research Group—is part of a larger effort in the department to understand how health care services price and quality interact with care seekers' characteristics and knowledge of the local health care market to determine patients' choice of health provider and bypassing behavior. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at wwane@worldbank.org.

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1 Introduction

In most Sub-Saharan African countries, weak competition in the health sector creates a situation where the population is often faced with local primary health providers which are monopolies. Despite this, some individuals choose to be treated in health centers farther away from their homes, and thus incur greater time and transport costs in order to obtain services perceived as better adapted to their needs.

Such bypassing of health centers has been shown by Akin and Hutchinson (1999) as being an important phenomenon in Sri Lanka. In the rural district studied, they found that close to 2/3 of individuals seeking treatment bypassed nearer facilities and in particular that the more severely ill patients tend to be more likely to bypass health facilities. Leonard et al (2002) examined bypassing in 90 villages in Tanzania and found that patients seek higher quality providers with better staff and basic supplies and tend to understand the importance of these factors for their illness conditions.

In this paper, we examine bypassing of health centers by individuals in Chad and the determinants of individuals' facility choice. We analyze how bypassing decisions are influenced by differences in quality, prices and competition among health providers across different socioeconomic groups. We make use of data collected in Chad as part of a Health Facility Survey organized by the World Bank in 2004 to examine empirically how bypassing decisions are influenced by differences in service quality, level of competition, and patients' socio-economic characteristics. The survey covers 281 primary health care centers in 21 districts as well as 1,200 health care employees and 1,801 patients. The matching of facility data with personnel and patient data allows us to control for patients' characteristics and incomes, types of illnesses, quality of facilities and price of services in determining facility choices.

Furthermore, we examine individuals' decisions to seek health services among formal and informal health providers. Informal providers in Chad represent an important part of the health sector in rural and urban areas. Accounting for these providers allows a better understanding of individual choices with respect to health services.

Contrary to Akin and Hutchinson (1999), who found that bypassing behavior is not very different across income groups in Sri Lanka, we find evidence of two distinct types of bypassing behaviors in Chad: poor individuals tend to bypass higher quality facilities because they cannot afford them whereas richer individuals bypass lower quality facilities and go for better care. Furthermore, we find that bypassing is significantly more prevalent among higher income groups. In that respect, income inequalities in Chad create health service inequalities. There are significant differences in patients' choice of facility across income groups as well as between rural and urban populations..

The paper is organized as follows. Section 2 describes the health sector in Chad. Section 3 presents the data from the health facility survey. Section 4 documents the available health infrastructure and services in Chad. Section 5 describes patients' characteristics and facility choices. Section 6 presents evidence of bypassing activities and examines differences among income categories. Section 7 introduces a simple theoretical model of bypassing. Section 8 presents econometric estimates of bypassing activities and Section 9 concludes the paper.

2 The Health Sector in Chad

Chad, a Central African country with a population of 8.8 million, is one of the poorest countries in the world, and with a GDP per capita of US$304 ranks 100th out of 103 countries (UNDP, 2005). Since independence in 1960, the country has experienced ongoing political instability which culminated in the 1979 civil war. Its economy is based mainly on agriculture and cattle rearing. The primary sector accounts for 38% of GDP and employs about 80% of the labor force. The adult illiteracy rate is 74.5%. Only 34% of the population has access to safe water and 8% to sanitary facilities.

2.1 Health Indicators

Health indicators in Chad are low and are even below what would be expected at the equivalent level of GDP (World Bank, 2004). Life expectancy at birth is 43.6 years and the child mortality rate (under 5 years) is 200 per 1,000 live births. Mother mortality is among the highest in Africa, close to 1100 for 100,000 live births. The

health problems affecting the population are mainly infectious diseases and parasites (malaria, diarrhea, respiratory infections). Outbreaks of meningitis and cholera are frequent in the country and cause many deaths among the poor and destitute.

2.2 Health System and Services

The health system in Chad is structured into four levels of responsibility. First, the ministry of health (MoH) is at the highest level and is in charge of stating national objectives for the health sector and formulating the adequate health policies. In second come the 14 Regional Health Delegations (RHDs) which are in charge of implementing the national strategy and managing health personnel at the regional level. Each RHD is composed of several districts for a total of 49 in the country. The districts, which constitute the third level of the health system, manage each several health facilities within their responsibility. Finally, the health facilities are at the bottom of the pyramid and are responsible for the provision of health services to the population. As of 2003, only 407 health centers out of 657 were functional (World Bank, 2004) and most could not provide all the services included in the minimum package of activities.

There are currently three doctors, two midwives and 4 nurses per 100,000 inhabitants, significantly below the WHO standard of 10 doctors, 20 midwives and 20 nurses. The vast majority of formal health sector personnel are active in the public and non-profit sectors. The formal, private for-profit, sector employs less than 1% of the health personnel (World Bank, 2004).

In addition to the formal health sector, there are many unaccounted for traditional healers and other informal practitioners known as “doctor choukous” and other resellers of medication. These informal health providers are active in both rural and urban areas.

3 Data and Survey

The data used in this paper come from the 2004 Quantitative Service Delivery Survey (QSDS) for which we drafted the survey instruments, organized the survey

field work and monitored data collection for which a local firm was hired. The survey's objective were to collect extensive information on the health sector at the frontline level, including resource use, delivery processes, services, staff and patient behavior and characteristics. Data were collected between May 1 and July 16, 2004, using questionnaires administered to regional delegates, district head doctors, health center heads, employees and patients.

A two-stage sample strategy was used for the facility sample. First, in each of the 15 regional delegations, either one or two districts, depending on the number of districts in the region, were selected at random.[1] Second, in each of the selected districts, all the health centers were identified and visited. Also, given the importance of the capital city, N'Djamena, all its health centers were included in the sample. The final sample of health clinics visited is presented in Table 1. Of the 281 health centers in the sample in the 14 regions surveyed, approximately two thirds are public, 14% are private, 16% are religious and 3% are run by NGOs. About two-thirds of the health centers are located in rural areas, less than one-quarter in the capital and 14% in other urban areas.

Table 1: Distribution of the Health Centers

	Capital	**Other urban areas**	**Rural**	**Total**
Public	26	26	139	191
Private	19	9	11	39
Religious	4	2	39	44
NGO	3	1	3	7
Total	52	38	191	281

Source: Chad 2004 QSDS

Information was also collected from patients using health centers. The objective was to interview 10 patients per health center.[2] The interviews were carried out at a certain distance from the health centers after patients' visits to the

[1] One regional delegation (B.E.T.) was not included in the final sample because of security problems in the region at the time of the survey.

[2] The sample strategy was to interview the first 10 patients after they had received a consultation, or all the patients that had consulted that day if the total was not greater than 10.The design of the patient sample is complicated by the random nature of patients visiting clinics at different hours each day. Some health centers might receive no patients one day and more than it can handle the day after. Without specific information on patient distribution, it is difficult to develop a strategy for representative sampling.

clinics. The patients sample is made of 1801 individuals (Table 2). About 61% come from rural areas, 20% are from the capital city and 19% are from other urban centers. About 2/3 of the patients in the sample are women. In rural areas and in the private health centers, the proportion of men in the sample is slightly higher (47%). Religious clinics treat the same proportion of men and women.

The average patient is 21 years old (median 20 years). Less than half of the patients in the sample have been to school (45%). In rural areas, this proportion is only 38%, versus 64% for patients in the capital. The average monthly household revenue of patients is 44 824 FCFA (US$90.30). The median revenue is much lower, at 15 000 FCFA (US$30.22), which illustrate the important differences in the distribution of income. In the capital, average income is three times higher than in rural areas and 1.7 times greater than in other urban centers.

Table 2: Sample of Patients

	TYPE				LOCATION			
	Public	Private	Religious	NGO	Capital	Other Urban	Rural	Total
Number of patients	1218	229	305	49	364	342	1095	1801
Percentage	67.6	12.7	16.9	2.7	20.2	19.0	60.8	100.0
Men (%)	32.7	46.9	41.3	33.3	32.5	32.8	38.1	36.0
Age (years)	19.5	24.1	21.0	23.6	20.1	19.6	20.9	20.5
Schooling (%)	37.5	67.0	53.8	61.7	63.9	45.9	38.0	44.5
Secondary +	18.6	47.1	23.7	34.1	44.6	25.7	16.0	23.5
Household Revenue Mean (000CFA)	36.1	100.2	31.1	99.3	86.1	49.7	29.9	44.8
Median (000CFA)	15.0	30.5	15.0	23.3	30.0	30.0	12.0	15.0

Source: Chad 2004 QSDS and authors' calculations.

We also make use of the ECOSIT II household survey carried out in Chad in 2004 that covers 6,697 households and 39,356 individuals. We match the data with the facility survey in order to derive asset based annual income measures.

4 Supply of Health Care: Services and Infrastructure

Before examining patients' characteristics and choices of health facilities, we first describe the health care infrastructure and services available to the population, including the level of competition among health providers in Chad.

Public sector health facilities account for approximately one-half of all health centers available in the capital, compared with three-quarters in rural areas (see Table 3). The private for-profit sector is mainly present in urban areas, and is absent from seven of the country's 14 regions.

Tableau 3: Staff Composition, Services Offered and Basic Infrastructure

	TYPE				LOCATION			
	Public	Private	Religious	NGO	Capital	Other Urban	Rural	CHAD
Number of clinics	191	39	44	7	52	38	191	281
%	68.0	13.9	15.7	2.5	18.5	13.5	68.0	100
% Doctors	0.4	10.2	0.7	8.2	10.5	2.4	0.07	2.3
% Midwives	5.0	5.6	15.2	2.4	2.0	3.4	8.15	6.4
% Other Qualified	32.3	36.8	30.3	45.2	41.6	34.7	30.45	33.1
% Non-Qualified	62.3	47.4	53.8	44.2	45.9	59.5	61.33	58.2
Hospitalization	3.4	17.1	18.6	14.3	8.0	5.3	8.5	8.0
Normal del.	78.5	45.7	90.7	57.1	32.0	57.9	91.6	75.6
Complicated del.	40.0	31.4	72.1	28.6	6.0	26.3	58.2	43.8
Malaria	98.9	94.3	97.7	85.7	92.0	97.4	99.4	97.7
IRA	98.3	85.7	97.7	71.4	86.0	97.4	98.3	95.9
Diarrhea	98.9	94.3	97.7	85.7	92.0	97.4	99.4	97.7
Malaria tests	8.3	48.6	16.3	28.6	40.0	18.4	7.9	15.4
Electricity (%)	19.9	71.8	54.6	71.4	71.2	57.9	18.9	33.8
Potable water (%)	59.2	84.6	68.2	100	94.2	73.7	55.5	65.1
Septic tank (%)	53.9	71.8	75.0	71.4	76.9	71.1	53.4	60.1
Telephone (%)	6.8	48.7	6.8	57.1	51.9	21.1	2.1	13.9
Beds (%)	37.7	82.1	65.9	71.4	59.6	60.5	44.0	49.1
Mean (Number)	1.2	4.6	8.7	3.7	3.5	2.7	2.8	2.9
Maternity beds (%)	12.0	25.6	34.1	14.3	9.6	15.8	19.9	17.4
Mean (Number)	0.2	0.9	1.5	0.9	0.4	0.4	0.5	0.5

Source: Chad 2004 QSDS and authors' calculations.

Approximately one-third of the capital's health centers are privately owned, compared with one-quarter in other urban areas and only 6% in rural areas. Private clinics rank second in importance in urban areas, while religious clinics rank second in rural areas, accounting for one-fifth of health centers.

4.1 Personnel

A salient feature of the Chadian health system is that there are very few doctors at the primary care level. Indeed, doctors make up only 2.3% of total personnel in health centers (Table 3). The rural area has virtually no doctors practicing in health centers. Doctors are rare in the public clinics. Only one doctor practices in a public

health center in a rural area in our sample, and it is in the rural area of the capital. Almost all the doctors in the public sector practice in district or regional hospitals. Most doctors are practicing in the capital and are mainly active in the private sector (73% of the 63 doctors in the sample).Qualified personnel other than doctors, such as nurses or technical agents make up about a third of the work force and are more numerous in NGOs. Midwives, who represent on average 6.4% of health personnel, are mainly present in religious clinics (15.2%) and in rural areas (8.1%). In fact, non-qualified staff make up the majority of health center staff (58.2% on average), with an even greater representation in rural areas (61.3%) and the public sector (62.3%).

4.2 Services

Table 3 presents the percentage of health centers that offer the main curative health services. Substantial differences are observed in terms of ownership types and location. In particular, private health centers and especially religious clinics are more active in terms of hospitalization compared with public clinics. Religious clinics are also especially active in terms of deliveries, both normal and complicated. The services of normal deliveries are also more available in rural areas as 92% of centers offer these services, compared with 34% of clinics located in the capital. The difference between the two regions reflects the distance to hospitals in rural areas.

Laboratory tests, particularly for malaria, are more accessible in private health clinics: 42% of such centers offer these services, compared with only 8% of the public health clinics.

4.3 Basic Infrastructure

Important deficiencies are present in terms of basic infrastructure in health centers in Chad, including electricity, water and sanitation (Table 3). About 2/3 of health centers do not have access to electricity, especially public clinics (80% versus only 28% of private clinics and NGOs). Access to potable water is also limited, and about 1/3 of centers function without drinking water. Furthermore, about 40% of centers do not have sanitation infrastructure. This proportion of clinics in rural areas is 46%, equal to that of public clinics. About a quarter of clinics of other affiliations do not have these infrastructures. Even in the capital city, 30% of clinics are not connected to municipal sanitation or septic tanks.

4.4 Beds

Approximately half of the sample's health centers have beds available to patients, including about 1/6 reserved for maternity wards. In rural areas, 53% of the beds available are in religious centers, while in the capital it is mainly the private clinics that offer beds (i.e. 64% of the 197 total beds available).

4.5 Competition

Competition among health providers could have important effects on service quality and prices. Despite some improvements of access to health services in the country over the last decade, the rural populations still suffer severe shortages in health services supply, and competition is very limited. Indeed, most of health centers visited in rural areas are the sole provider of care within a 2 km radius (Table 4) and thus enjoy a monopoly status (84%).

Table 4: Competition

	TYPE				LOCATION			Total
	Public	Private	Religious	NGO	Capital	Other Urban	Rural	
Percentage (%)								
Monopoly	63.4	25.6	77.3	14.3	1.9	13.2	83.8	59.1
Private Competition	11.0	41.0	0.5	28.6	51.9	21.1	3.1	14.6
Number (of competitors)								
Total Competition	0.7	2.4	0.4	1.7	3.0	1.7	0.2	0.9
Private sector	0.16	1.0	0.05	0.29	1.08	0.29	0.04	0.26

Source: Chad 2004 QSDS and authors' calculations.

The capital offers a strikingly different picture since only 2% of the health centers can be considered as monopolies (in the sense defined above), 52% of them face fierce competition from the private for-profit sector. Overall, however, competition is weak, with 0.3 clinics located in a 2-km radius of health centers visited. Religious clinics tend to locate in areas less occupied by other health centers; only 0.6 centers are found within 2 km of such non-profit clinics, including less than 0.1 private clinics in their neighborhood.

5 Characteristics of Patients' Visits and Choices of Facilities

Having examined the supply of health care infrastructure and services available to the population, we now examine the characteristics of patients using clinics, in particular reported symptoms and costs of visits.

5.1 General Characteristics of Patients

Characteristics of patients visiting health centers vary considerably according to the type of facility and location (Table 2). In the capital city in particular, a larger proportion of patients using the private clinics and NGOs are schooled (80% vs 60% for patients using public and religious clinics).

The patients of religious and public clinics seem also to be poorer. Indeed, the average monthly income of patients in these centers is 31,100 FCFA (US$63) and 36,000 FCFA (US$73), respectively, compared with about 100,000 FCFA (US$ 201) in private clinics and NGOs. Furthermore, in the capital the average revenue of patients in private clinics is 3.5 times higher than those using public and religious clinics. The tendency is about the same outside of the capital, but the difference is less pronounced between patients using private clinics and others (1.8 to 1 on average).

5.2 Main Reasons for Visits

The main reason patients invoke to justify their visit to the facility is malaria, a distant first which affects half of the patients (see table 5). Diarrheic problems are the second most common complaint, affecting about 1 in 5 patients, followed by cough, weight loss and worms.

About a quarter of patients complain of multiple symptoms during their medical visits. These patients represent a larger proportion of patients in public health centers (27%) than private centers (15%) or NGOs (12%).[3]

[3] Few differences are noted between urban and rural areas in terms of number of symptoms reported, but significant differences are observed among regional delegations. In Salamat, almost half of the patients report multiple problems (on average 1.8 problems) and more that 43% in Guera and Ouaddai. In contrast, less than 7% of patients in Logone Occidental report multiple symptoms to justify their visits to health centers.

The number of days during which patients reported symptoms before visiting a health center is on average 10 (median 5 days). Regional variations observed could be linked to relative access to health centers. For instance, the average duration of symptoms is three times longer in Salamat than in Tandjile (14 days vs. 4.6 days).

Table 5: Reasons for Visits and Symptom Duration

	TYPE				LOCATION			
	Public	Private	Religious	NGO	Capital	Other Urban	Rural	Total
Reason for the visit (%)								
Malaria	51.6	43.6	50.2	24.2	52.1	48.5	49.4	49.7
Diarrhea	21.4	17.8	22.5	9.1	16.8	20.8	22.0	20.8
Cough	11.6	4.0	4.1	15.2	10.1	11.3	8.8	9.5
Weight loss	19.6	4.5	7.4	15.2	8.4	7.9	10.1	9.4
Worms	8.2	7.9	15.9	3.0	9.4	6.5	10.1	9.3
Multiple Symptoms (%)	28.8	14.9	22.0	12.2	24.2	25.7	25.8	24.4
Duration of symptoms								
Number of days Average	10.0	11.2	10.7	10.8	12.9	11.2	9.2	10.3
Number of days Median	5	5	6	7	5	6	5	5

Source: Chad 2004 QSDS and authors' calculations.

5.3 Costs of visits

Table 6 presents total payments for a health visit reported by patients and the share of these costs represented by consultation fees, laboratory tests and prescribed medications. Overall, the average cost of a visit is 2,516 FCFA (US$5.07). Average payments are much higher in the capital but relatively similar in rural areas and other urban centers.

The least expensive visits are noted in NGOs and religious clinics, with an average cost of 1,500 FCFA. By contrast, visits to private clinics are by far the most expensive especially. in the capital where a visit to a private clinic cost on average close to 6 times more than in a public clinic.

Table 6: Composition of Costs of Visits (percentage and total costs)

	TYPE				LOCATION			
	Public	Private	Religious	NGO	Capital	Other Urban	Rural	Total
Consultation (%)	15.8	19.2	18.9	14.8	16.7	22.6	13.6	16.9
Laboratory Tests (%)	10.0	21.4	6.1	0.7	18.8	3.2	1.9	12.0
Medication (%)	74.2	59.4	75.0	84.5	64.5	74.1	85.1	71.1
Total costs (FCFA)	2375	4987	1601	1397	4320	1191	1276	2516

Source: Chad 2004 QSDS and authors' calculations.

Examining the composition of costs of medical visits to health centers, expenditures on medication represent about ¾ of patients' total costs. Medical consultation costs represent less than 14% of the total cost of a visit in rural areas compared with 23% in urban areas other than the capital. As for laboratory tests, it is only in the capital that they represent a significant portion of patient expenditures (19%).

5.4 Patients' Knowledge of Alternative Care Availability

Before examining the choice of health facilities by patients and in particular the patterns of bypassing, it is useful to examine patients' knowledge of health care services available.

As shown in Table 7, about 39% of patients report that health care providers (either formal or informal) other than the one they visited the day of the survey are located close to their home. With respect to the modern health sector only, about a quarter of the patients report having access to alternative health centers or hospitals.

It is interesting to note that the capital city offers not only more modern health service providers but also more informal providers. Indeed, 28% of patients there report having informal care in their neighborhood versus 19% in rural areas.

Table 7: Patient's Knowledge of Alternative Care Availability (percentages)

	TYPE				LOCATION			
	Public	Private	Religious	NGO	Capital	Other Urban	Rural	Total
Total competition	33.7	63.8	35.1	77.6	64.8	38.6	30.4	38.9
Formal sector	23.3	53.3	21.6	69.4	59.9	32.5	16.2	28.1
Public clinics	12.2	29.8	14.4	52.1	38.3	18.2	7.7	15.9
Private clinics	4.9	21.5	3.9	20.8	22.6	5.9	2.7	7.3
Religious and NGO	1.2	6.1	1.0	8.3	7.4	0.9	0.6	2.0
Informal sector	15.9	30.1	20.0	26.5	27.8	9.1	18.6	18.7
Docteur Choukous	9.7	26.3	9.2	10.4	21.7	4.7	10.6	11.7
Traditional healers	9.2	11.4	14.1	16.7	13.0	5.3	11.3	10.5

Source: Chad 2004 QSDS and authors' calculations.

6 Measuring and Assessing Bypassing

Having examined in the previous sections the characteristics of health service provision as well as patients' characteristics we now examine how these affect choices of health facilities. The focus is on individuals' decision to bypass available health facilities.

6.1. Measuring Bypassing

Previous work on bypassing, e.g. Akin and Hutchinson (1999) or Leonard et al. (2002), have mostly relied on a theoretical measure of bypassing. In contrast to this approach, this paper measures bypassing using data collected from patients about their knowledge of existing alternative providers in their neighborhood. Therefore, a patient is said to have engaged in bypassing if and only if (1) she *knows* about other available providers, and (2) the facility she attended is *not the closest* from her household within the pool of providers available.

Akin and Hutchinson (1999) study bypassing in one district in Sri Lanka. They match a facility dataset which contains the complete set of facilities in the district with a sample of households surveyed in the same district. Both household and facility geographic information is available, they can therefore compute for each household the distance between the household and all facilities in the district. In the household survey, individuals indicate the facility they visit during their last illness spell. Bypassing is then assumed if the facility visited is the not the nearest to the

household as determined by computed distances. This procedure implicitly assumes that households have perfect information about their health care market. The same implicit assumption is also used in Leonard et al. (2002), where from the registry records of a sample of 42 facilities, the authors draw a sample of users. Using patients' information recorded by the facility, which in addition to age, gender and symptoms, include the village of origin, the authors compute distances to health centers.

Contrary to Akin and Hutchinson (1999) and Leonard et al. (2002) this paper defines bypassing using the information set of the patients. Each patient was asked whether she could have used other facilities (formal or informal) than the one she just visited. Then, for each such facility and the facility she was in, the patient were asked to provide information on the distance and travel time from the facility to her household. The set of facilities the patient identified is labeled her "local health market". Moreover, all facilities which are farther from the patient's household, according to her own estimated distance, than the facility she ultimately visited are "bypassed" facilities.

This measure of bypassing seems more adequate than previous attempts to measure the phenomenon for at least two reasons. First, the patient's knowledge of her 'theoretical' health care market is in all likelihood imperfect, therefore using estimated distances a patient may be considered to have bypassed a given facility which she "in fact" does not know about. Second, individuals do not forcefully have a good sense of distance and their estimated distance may be different from the "objective" distance as computed from maps. Our definition of bypassing, however, is based on the patient's own judgment of distance to available facilities. It is the richness of our data set that affords us the availability of -what we contend is- a more accurate measure of bypassing.

6.2 The Importance of Bypassing

The extent of bypassing of the formal and informal sectors, measured using patients' information, is presented in Table 8. More than a third (35.6%) of the patients had at least two providers (formal or informal) available to them, cherry-picked their preferred provider on the basis of either cost or quality, and knowingly travelled a higher distance to seek care. While about 1/4 (24.6%) of patients bypass the modern

sector including hospitals and pharmacies in their local health market, only 18% of patients choose to bypass informal providers (i.e. traditional) in their neighborhood to go to a modern health center.

Unsurprisingly, it is in areas where competition is the fiercest that bypassing is more intense. In the capital city, 54% of patients claim they bypassed at least one modern health provider to seek care elsewhere. This number drops down to 28% in urban areas, and 14% in rural areas probably because of the low level of care supply.

Once the informal sector is accounted for, the bypassing rates jump to 28% for the rural areas, 34% in other urban areas, and 61% for the capital city N'djaména. The inclusion of the informal sector therefore doubles the rural bypassing rate, which is probably due to the large number of informal care providers in those areas who fill in the void left by modern health centers.

Furthermore, patients who attend private clinics, both for- and not-for-profit are more likely to engage in bypassing behavior. Indeed, 57% of NGOs' patients and 49% of private clinics' patients have bypassed another modern provider, vs. 20% and 19% for patients in public and religious facilities respectively. In the capital where more than half of the patients bypassed a modern facility, 34% have bypassed a public facility vs. 21% a private facility. Overall, 14% of the patients say they bypassed a public provider and 6.8% a private provider. As for the informal sector, it has been bypassed by 18.2% of the patients.

Table 8: Bypassing of Health Centers (Percentage)

	TYPE				LOCATION			
	Public	Private	Religious	NGO	Capital	Other Urban	Rural	Total
Public Clinics	10.5	28.2	12.5	44.7	34.7	15.1	6.8	14.0
Private clinics	4.8	19.4	3.9	17.0	21.0	4.4	2.9	6.8
Non profit (religious/NGO)	1.8	6.2	1.3	6.4	7.0	0.9	1.4	2.4
Formal sector + hospitals and pharmacies	20.1	49.3	19.0	57.4	54.3	27.8	13.9	24.6
Informal sector	15.6	28.6	19.3	25.5	26.0	8.9	18.5	18.2
Total (formal + informal)	30.3	60.8	32.8	70.2	60.5	33.7	28.1	35.6

Source: Chad 2004 QSDS and authors' calculations.
Note: The numbers do not add up to the total because a patient may bypass more than one type of health care provider.

Table 9 presents the likelihood of bypassing for individuals who live in households that belong to the poorest and richest income quintiles in Chad. It shows that (conditional on seeking care) patients in rich households are significantly more likely to bypass providers than poorer patients. More specifically, patients in the 5th quintile are 3 times more likely to bypass modern providers as are patients in the poorest quintile. Nearly 37% of patients in the 5th income quintile bypassed a provider compared to 20% of patients in the 1st quintile.

Table 9: Bypassing of Health Centers by Quintile (Percentage)

	1st Quintile	5th Quintile
Modern sector	9.9	28.6
Informal sector	12.7	18.3
Total	19.8	36.5

Source: Chad 2004 QSDS and authors' calculations.

Focusing on the bypassing of private facilities, we observe that it is mostly people in the two richest quintiles who bypass private providers, with a significantly higher probability for the 5th quintile as shown in Table 10. It is also noteworthy that for all income groups, patients of private providers are more likely to bypass another private facility. For all levels of income, the patients of the formal public sector are the least likely to bypass a private provider.

Table 10: Bypassing Private Facilities

	Public		Private		Not-for-Profit	
Quintile	n	% Bypassed private	n	% Bypassed private	n	% Bypassed private
Poorest	302	2.6	18	5.6	58	3.4
Q2	238	1.7	30	0.0	104	2.9
Q3	241	4.6	32	6.2	77	2.6
Q4	239	4.6	49	16.3	63	9.5
Richest	185	13.0	98	33.7	50	14.0

Source: Chad 2004 QSDS and authors' calculations.

6.3 Costs of bypassing

Because of the important impact on travel and direct medical costs involved, bypassing decisions are not casually taken by patients. By visiting a health center which is not the closest to their residence, the 'bypassers choose to travel a distance on average twice longer than patients who go to the closest alternative (Table 11). The average travel time between the house and the clinic is also multiplied by two,

from about one hour to two hours. In rural area, this travel time to reach the clinic goes from 64 to 160 minutes on average, and in the capital from 29 to 49 minutes.

In addition to traveling longer and farther, patients who bypass facilities nearer to their residence to seek care better adapted to their health needs, also accept frequently to incur higher user direct costs of care. Indeed, bypassing patients spend on average more than 2.5 times on consultation costs than do patients who use health centers closer to their home. When total costs of visits, including tests and prescription drugs, are considered, bypassers spend on average 2.3 times more.

While evidence seems to indicate that bypassing is mainly motivated by a quest for greater quality of care in more distant centers, there are also indications that bypassing can partly be explained as an attempt to reduce the cost of health. In our data, this is particularly true for patients who bypass a modern provider to visit an NGO. Indeed, those patients have spent on average 71% and 32% less than those who attended the closest clinic in rural areas and the capital city respectively. Also, patients using private clinics in the capital and that have bypassed a modern provider have spent on average 28% less than patients in private clinics that have chosen the closest provider (12 279 FCFA vs. 17 053 FCFA respectively) (not illustrated).

Table 11: Cost Incurred by Bypassing the Formal Health Sector

	TYPE				LOCATION			
	Public	Private	Religious	NGO	Capital	Other Urban	Rural	Total
Distance from Residence (Km)								
Without bypassing	7.7	3.2	5.6	3.1	3.2	3.4	8.6	6.8
With bypassing	14.5	8.7	21.3	27.1	11.2	15.8	18.0	14.3
Travel time (Min)								
Without bypassing	57.2	64.8	54.9	42.1	29.4	58.0	63.7	57.5
With bypassing	186.7	43.2	159.3	51.1	48.6	258.2	161.0	123.8
Consultation costs (FCFA)								
Without bypassing	173	614	300	285	569	265	167	245
With bypassing	211	1348	512	105	1041	292	243	608
Total costs of visits (FCFA)								
Without bypassing	1491	3794	1697	1472	4603	1285	1378	1795
With bypassing	1835	8551	3163	1333	6642	2011	2374	4031

Source: Chad 2004 QSDS and authors' calculations.

The next section presents a simple model of bypassing which will then be tested empirically.

7 The Bypassing Model

Patients engage in bypassing behavior, if among providers available to them they knowingly choose to seek treatment in a facility which is not the closest to them. As already noted, it is important to specifically ask to the patients questions relative to their knowledge of available care options. The patients are asked to evaluate the distance they traveled to seek care in the facility they are at, and the distance from their home to all other facilities they could have gone to. This permits to precisely delineate the patients' local health market and compute the effective measure of bypassing in contrast to a "theoretical" one as in Akin and Hutchinson (1999) and Leonard et al. (2002). A patient is then considered to have bypassed all the facilities which are nearer than the chosen facility.

Let us quickly explicit our bypassing model. Each individual is characterized by the couple (y,h) which is income and health stock. The welfare of an individual is defined by the utility function $u(x,h)$ where x is the consumption of the numeraire good.[4] Everybody enjoys the same initial stock of health H_0. Any individual can be hit by an exogenous health shock with probability α which for the sake of simplicity is independent of income y.[5] The health shock translates into a (temporary) loss of health stock of size $\ell \in [\underline{L}, \overline{L}]$ which reflects the (perceived) severity of the illness. When sick, the individual can either seek care by visiting a provider, or stay home. Let the probability of cure when visiting a provider j which offers care of quality q_j be $\pi(q_j)$, in case the sick does not seek care the probability of cure is $\pi(0)$.[6] The probability of cure is assumed increasing and concave in the quality offered, i.e. $\pi' > 0$ and $\pi'' < 0$. The quality of the providers depends on its characteristics some of which are observable by the patients. The patients then form beliefs on quality of care offered by each available provider, which factor in their final care seeking decisions. Regarding (expected) health status, there are three possible states for any given individual:

[4] The utility function could take the simple quasi-linear form i.e. $u(x,h) = v(x) + \theta \cdot h$, to allow income to influence the choice of the provider, see for instance Gertler and van der Gaag (1990).

[5] The probability of getting sick could be contingent to income level and become $\alpha(y)$ to account for instance for better preventive practices, or safer household health related behaviors, in higher income groups.

[6] This probability may be strictly positive in case of self limiting illnesses, and zero otherwise.

$$h = \begin{cases} H_0 \\ H_0 - \ell + \pi(0) \cdot \ell \\ H_0 - \ell + \pi(q_j) \cdot \ell \end{cases}$$

It is in the last two states of nature that the health shock has hit. In the second state of nature the sick individual does not visit a provider, whereas she does in the third. Visiting a provider increases, in expected terms, the recovered health stock.

The health market is defined by all health providers in the country. We assume without loss of generality that there are N such providers and the health market is therefore $HM = \{P^j\}_{j=1}^{N}$, where P^j is provider j. Each person has, however access only to a *local* health market in which a subset of providers operates. We denote individual i's local health market as $LHM_i = \{P^j,\ i \text{ knows provider } j\}_{j=1}^{N}$. We do not, however, restrict the local health market to a defined geographic area. Indeed, a far away facility in the country's capital may well be in the local health market of a rural dweller. What is important is that the care seeker knows about the facility and has contemplated the option of using it.

A sick individual will pick, within her local health market, the facility that maximizes her utility. All the other facilities will be considered as bypassed facilities. More formally among the facilities $(p_k, q_k, t_{ik})_{k \in LHM_i}$ that charge p_k for consultation, offer a perceived quality of care q_k and which patient i will reach by incurring transportation costs t_{ik}, the chosen facility j is such that:

$$\begin{cases} y_i \geq p_j + t_{ij} \\ U(y_i - p_j - t_{ij}, H_0 - (1 - \pi(q_j)) \cdot \ell) \geq U(y_i - p_k - t_{ik}, H_0 - (1 - \pi(q_k)) \cdot \ell) \\ U_{ij} = \max(U_{ik})_{k \in LHM_i} \end{cases}$$

We do not consider self-medication because in our data we only have people who indeed sought care.[7] The patient will choose the facility that maximizes her (expected) utility. The patient will choose provider *j* over provider *k* if (1) the patient can afford facility *j*, and (2) the income value of the differential gain in recovered health stock from visiting provider *j* instead of *k* outweighs the utility loss incurred because of the higher total costs involved in choosing provider *j,* and (3) condition (2) must be satisfied for all facilities in the patient's LHM when compared to facility *j*.[8]

The patient engaged into bypassing if her LHM is not restricted to the facility they visited. Although we know the number of facilities a patient bypassed, we can not identify those specific facilities. We resort to assigning to each patient a LHM which coincides with the medical district to which the chosen facility belongs. Therefore, conditional on the information that the patient has bypassed some facilities, we consider that the patient has bypassed the "average" facility in the district i.e.

$$U_{ij} \geq \int_{\substack{k \in LHM_i \\ k \neq j}} (U_{ik})dk \quad \text{or} \quad U_{ij} \geq \overline{U}_{k \in LHM_i}$$

8 Econometric Specification and Analysis

This section presents the econometric specification used to implement our bypassing model. The data requirements for implementing such a model are impressive. Indeed, for each patient, we must be able to identify all providers in her LHM but also explicitly link the providers to the health facility survey. Unfortunately, the survey did not collect information on each provider in the patient's LHM. Instead, for each type of provider, the survey collected information on the number of such facility bypassed and the distance of the closest such facility to the patient's home. Therefore, we cannot attach a provider from the facility survey to any particular patient's LHM. However, since the survey provides a census of facilities within each

[7] Because we observe only individuals who went to the health provider and thus decided to seek care, we will only consider utilities conditional on falling sick and seeking care to a provider. Self-medication is a dominated strategy for the patients in our sample.

[8] Note that no patient would visit a more expensive provider whose expected quality if care is also lower than another facility in the patient's local health market.

district visited, we can aggregate the observable information on the facilities to build the "average district facility" which is defined as the facility bypassed by patients.

To implement the above model econometrically, we posit that the utility that patient *i* derives from visiting provider *j,* following most of the literature on provider's choice, is given by:

$$U_{ij} = \alpha + \beta_j \cdot X_i + \gamma \cdot Z_{ij} + \mu_{ij} \quad (1)$$

where X_i represents the patients characteristics such as age, education, income, etc., Z_{ij} is the chosen facility's characteristics such as its quality as perceived by the patient, the price it charges for the patient's ailment, the distance from the patient's home, etc., and μ_{ij} is simply an error term. Many variables affect the quality of the facility some of which are easy to gauge by patients such as whether the personnel is amicable, infrastructure is in good condition, water and electricity are readily available, etc. Some determinants of the facility's quality, however, transcend the patients' knowledge. Patients rarely know whether the doctor exerted the optimal effort and provided the best prescription for an ailment. Often, patients are even unable to assess whether the doctor gave the right diagnosis.

The average facility in the patient's local health market would provide her with the utility

$$\overline{U}_i = \alpha + \overline{\beta} \cdot X_i + \gamma \cdot \overline{Z}_i + \overline{\mu}_i \quad (2)$$

The patient chooses facility *j* and bypasses the others if (1) if greater than (2). We know the facility in which the patient sought care and whether or not she bypassed other facilities. The model we use to explore further the bypassing phenomenon in Chad is the following simple probit model:

$$\Pr(\text{Bypass} \mid X_i, Z_{ij}, \overline{Z_i}) = \Phi((\beta_j - \overline{\beta}) \cdot \mathrm{X}_i + \gamma(Z_{ij} - \overline{Z_i}) + (\mu_{ij} - \overline{\mu}_i)) \quad (3)$$

Note that the probit specification stems from our lack of data on the facilities that each patient specifically bypassed. Had we had this information, we would instead have considered a (nested) conditional logit or a multinomial probit, which are the usual

models for this type of exercise. Many authors, including Mwabu et al. (1993) and Leonard et al. (2002), use a conditional logit but assume the patient knows the facilities it bypassed. Mwabu et al. (1993) arbitrarily choose for each type (government, mission, private, self-treatment) of facility not chosen by the patient, the nearest such facility as the bypassed facility. This is arbitrary because it may well be that the patient had no knowledge of a closer facility, as a matter of fact the patient may have chosen that theoretically bypassed facility had she known about it.

8.1. Estimation of Household Incomes

A serious limitation of our data concerns the patient's household income. The patient or the person who accompanies her was asked about the total income of her household. However, we do not know the relationship of the interviewees to their head of household, it is therefore not clear whether either of them is the best person to answer such a question. For these reasons, we chose to discard the income reports from the patients and instead estimated those incomes using data from a nationally representative household survey which was being conducted around the same time. This survey, ECOSIT II, covered 6,697 households and 39,356 individuals across the country.

In order to link the surveys, we incorporated the module on asset holdings and dwelling characteristics of the household survey's questionnaire into our patient's questionnaire. There is common information on eight assets (appliances and vehicles), seven characteristics of the household's dwelling, further broken down into 16 dummy variables. We then use small area estimation methods to estimate the income of our patients' households. Specifically, using the ECOSIT II we run the regression $Inc_h=\Sigma\alpha_i A_{ih} + \Sigma\beta_j R_{jh} + \varepsilon_h$ where Inc_h is household's h income, A_{ih} is the number of asset i that household h holds, and R_{jh} are regional dummies and household size to estimate the $\hat{\alpha}$ and $\hat{\beta}$. We then use the estimated coefficients to predict our patients' household income.

8.2. Building Quality Indices

Because the quality of health care provided by a health center is likely to influence its demand and the likelihood that it is bypassed it is among the main variables of

interest in the paper. The measurement of the quality of care is, however, still an unsettled issue in the literature. It is also likely that patients' bypassing decisions are partly based on subjective perceptions of the quality offered by facilities in their choice set rather than the facilities' objective quality. It is important for policy to determine to which extent, controlling for prices and other relevant variables, subjective quality perceptions dominate the providers' "true" quality which is the one that matters for the health of the population. If *ceteris paribus* patients bypass a nearer high-quality facility to seek care to a more remote facility just because their perceptions are "wrong", then there is room for policy intervention through, say, report cards to improve the health of the population.

8.2.1. Objective Quality Indices

The facility survey collected information on the health centers' infrastructure, equipment, and personnel which we use to build three composite indices that attempt to capture the objective quality of care. The first index is the infrastructure index which is an average of providers' access to water and electricity. Second, using staff data, the personnel index is simply the ratio of skilled to unskilled employees in the facility. This index captures the facility's staff-mix. However, several recent studies have shown that counting the number of employees may not provide an accurate measure of health workers' labor supply in the facility because of high absenteeism rates. We therefore include the rate of absenteeism in the facility to complement the personnel index. A staff is considered absent if she was not on the premises of the facility at the time of the survey. On average, about 21% of health workers were unaccounted for at the time of the survey. The absenteeism rate is even higher for doctors and technicians and reaches an average of 33%. Though, this seems low relative to absenteeism rates observed in other developing countries (see for instance Chaudhury et al., 2006), it could still negatively impact the quality of care offered.

In addition to these indices, we also constructed a price index using user fees the health centers charge for 10 main services such as acute respiratory infections or malaria. We also use the difference between each facility's price index and the

district average price index as a control variable. Because they use hard information on providers, the four indices described above are dubbed "objective" measures.

8.2.2. Subjective Quality Indices

To construct the subjective quality indices, we use the survey data on the patients' perceptions of both used and bypassed facilities. The patients were asked to provide the reasons they chose the specific facility they visited through a battery of binary questions. Among the reasons listed one finds questions related to (1) availability of specific services, (2) waiting time, (3) proximity to markets, (4) quality of service, (5) drugs availability, and (6) consultation and drugs prices.

8.3. Results

Because some patients' characteristics such as age, gender and education level may influence bypassing, they are included as controls in all regressions. Some additional controls considered are the type of ailment; the illness' severity proxied by the number of days the patient has been sick, and whether the patient has multiple symptoms. Finally, we control for few characteristics of the health facility, such as its geographical location, whether it is a monopoly, the number of beds, whether it is for-profit, etc. Table A2 in the appendix presents summary statistics of variables.

Table 12 shows the results of the probit regressions of equation (3). The first four models (columns 1-4) show for the whole sample the determinants of bypassing specific type of providers, e.g. public health center. The last three models (columns 5-7) focus on the modern sector, i.e. docteur choukous are not considered, and try also to identify differences across income groups by narrowing the sample to patients in the 1st and 5th income quintiles. Unlike Akin and Hutchinson (1999), we find that income is a key determinant of bypassing behavior. As a matter of fact, individuals in the richest quintile are significantly more likely to bypass a provider than anybody else. Moreover, the likelihood to bypass a provider increases with income (column 5). Patients in the poorest income quintile have a 10.8% lower probability of bypassing a modern health provider than patients in the richest quintile (column 5).

With respect to subjective quality variables, patients are more likely to have bypassed another facility when they perceive the facility they went to seek care as

offering a higher quality of service. Indeed, patients who claim that the facility they visited offers a higher quality of service are 2.9%, 3.1%, and 10.6% more likely to have bypassed a public, private, or any type of facility respectively.

Table 12: Determinants of Bypassing Behavior - Probit Marginal Effects

	Patient Bypassed Facility of Type				Bypassed Modern Providers		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Any	**Public**	**Private**	**Religious**	**All**	**Poorest Quintile**	**Richest Quintile**
Household Income Quintiles							
Q1	-0.075	-0.018	**-0.017**	**-0.013**	**-0.108**		
	-1.16	-0.38	**(2.12)****	**(2.64)*****	**(2.04)****		
Q2	**-0.143**	**-0.083**	**-0.038**	**-0.017**	**-0.165**		
	(3.77)***	**(5.40)*****	**(3.26)*****	**(3.20)*****	**(6.39)*****		
Q3	**-0.096**	**-0.058**	**-0.027**	**-0.016**	**-0.121**		
	(2.66)***	**(3.16)*****	**(8.90)*****	**(4.86)*****	**(4.11)*****		
Q4	-0.051	-0.027	**-0.029**	**-0.007**	**-0.062**		
	-0.99	-1.28	**(5.58)*****	**(1.84)***	**(2.07)****		
Patients Subjective Quality Assessments							
Others don't offer service	**0.129**	0.081	-0.007	0.01	**0.133**	-0.021	-0.061
	(1.68)*	-1.63	-0.78	-1.34	**(1.89)***	-0.18	-0.99
Short wait time	0.051	-0.004	-0.013	-0.002	0.034	**0.15**	0.024
	-1.38	-0.17	-1.48	-0.55	-0.89	**(1.85)***	-0.26
Close to markets	-0.019	-0.026	-0.011	0.004	-0.023	0.056	-0.022
	-0.9	-1.34	-1.62	-0.83	-0.67	-0.82	-0.3
High quality service	**0.106**	**0.029**	**0.031**	0.003	0.029	**0.213**	-0.091
	(3.37)***	**(2.02)****	**(5.31)*****	-0.64	-1.04	**(2.65)*****	-1.24
Drugs always available	0.018	-0.016	0.007	-0.004	-0.02	0.058	0.095
	-0.43	-0.78	-0.68	-1.1	-0.91	-0.71	-0.69
Drugs cheaper	-0.018	0.002	-0.008	-0.009	-0.007	-0.147	0.005
	-0.48	-0.09	-0.97	-1.35	-0.22	-1.57	-0.06
Objective Quality Measures							
Infrastructure (Wat & Elec)	0.066	-0.004	**0.016**	-0.007	0.04	**-0.126**	0.047
	-1.38	-0.27	**(2.47)****	-1.48	-1.25	**(2.33)****	-0.78
Skilled Staff ratio	**0.022**	**0.009**	**0.002**	0	**0.017**	-0.021	**0.037**
	(2.79)***	**(2.38)****	**(3.13)*****	-0.55	**(3.36)*****	-0.58	**(3.27)*****
Staff absenteism	**-0.004**	**-0.002**	0	0	**-0.002**	-0.002	**-0.006**
	(4.44)***	**(3.25)*****	-1.2	-0.05	**(1.97)****	-1.31	**(3.67)*****
Facility vs District costs	**-0.004**	**0.002**	**0.001**	0	0	**-0.055**	0
	(1.65)*	**(2.28)****	**(1.94)***	-0.12	-0.02	**(1.99)****	-0.03
Facility Characteristics							
Rural	**0.113**	**-0.04**	0.003	**-0.013**	0.034	0.066	0.15
	(2.74)***	**(1.72)***	-0.17	**(1.83)***	-0.86	-0.8	-1.13
Monopoly	**-0.202**	**-0.071**	**-0.038**	0.006	**-0.217**	**-0.276**	**-0.284**
	(5.25)***	**(2.03)****	**(2.07)****	-0.74	**(4.29)*****	**(2.71)*****	**(2.29)****
Private	**0.179**	**0.058**	**0.025**	**0.008**	**0.127**	**0.637**	**0.398**
	(4.96)***	**(1.81)***	**(2.15)****	**(1.69)***	**(3.26)*****	**(5.28)*****	**(2.74)*****
Not-for-profit	0.068	**0.073**	-0.01	0.006	0.02	**0.289**	**0.258**
	-1.6	**(3.34)*****	-1.56	-0.76	-0.72	**(2.45)****	**(3.15)*****
Beds	**0.002**	0.001	0.001	**0**	**0.003**	**0.008**	-0.004
	(4.12)***	-1.56	-1.34	**(1.66)***	**(3.48)*****	**(5.17)*****	-0.71
Tests	0.051	0.011	-0.003	0.001	0.048	-0.107	-0.029
	-1.31	-0.8	-0.21	-0.08	-1.36	-0.8	-0.7
External Support	0.047	0.009	**0.02**	-0.005	0.019	0.056	**0.272**

	-1.64	-0.49	**(2.10)****	-0.87	-0.74	-0.81	**(3.59)*****
Patients Characteristics							
Male	0.003	-0.001	0.008	-0.004	0.01	-0.095	-0.003
	-0.16	-0.07	-1.29	-0.99	-0.56	-1.35	-0.06
Age	-0.001	0	0	0	0	-0.001	0.003
	-1.11	-0.74	-0.06	-1.2	-0.06	-0.45	-1.55
Education	**0.061**	0.006	**0.012**	0.001	**0.032**	0.028	**0.052**
	(2.95)***	-0.72	**(6.50)*****	-1.44	**(2.64)*****	-0.56	**(3.28)*****
Reason visit	-0.048	0.001	**-0.032**	-0.003	-0.042	-0.055	-0.059
	-1.3	-0.05	**(3.44)*****	-0.46	-1.31	-0.64	-0.77
Multiple Problems	0.042	0.002	**0.021**	0.004	**0.052**	-0.014	**0.164**
	-1.53	-0.11	**(2.89)*****	-1.18	**(1.98)****	-0.2	**(1.82)***
Number of days sick	-0.001	0	**0**	**0**	0.001	-0.002	0.001
	-0.65	-1.18	**(1.67)***	**(2.58)*****	-1.62	-1.45	-0.94
Time to reach facility	**0**	**0**	0	**0**	0	**0**	**0.003**
	(2.57)**	**(2.86)*****	-0.53	**(2.11)****	-1.61	**(2.29)****	**(1.96)***
Visited another provider	**0.279**	**0.07**	**0.026**	0.002	**0.134**	**0.649**	**0.152**
	(4.97)***	**(2.73)*****	**(3.59)*****	-0.44	**(3.59)*****	**(6.81)*****	**(2.13)****
Observations	1335	1335	1335	1335	1335	257	249
Pseudo R-squared	0.18	0.2	0.27	0.15	0.25	0.35	0.24
Log Likelihood	-718.02	-426.7	-246.19	-125.88	-558.15	-100.31	-130.67

Robust z-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Furthermore, there is strong evidence that patients choose the facility based on their expectation that the care they need is available. Indeed, the fact that patients think (or know) that other providers do not offer the specific service they need translates into a 13.3% higher probability that the patient has bypassed a modern provider to seek care.

Among the objective quality measures, the patients are more responsive to the ratio of skilled to unskilled. Interestingly enough, it is also the quality indicator patients are better able to gauge and is therefore closer to a subjective measure. Patients who bypassed any type of facility, and especially public facilities are more likely to visit a facility with a higher proportion of medical staff. Patients in the richest income quintile seem even more responsive to that ratio. Staff absenteeism reduces the probability that patients have bypassed another facility to come and seek care.

With respect to the price index, the less expensive the facility is relative to the average facility in the district, the more likely the patient is to have bypassed

another facility. Overall, bypassers appear thus to be motivated by lower prices. However, for patients who bypassed a public or private facility, the coefficient is positive and significant indicating that they were willing to bypass closer facilities to come to that specific facility even though it charges higher prices. This result supports the descriptive findings in section 6.3 where we observed that bypassing is associated with higher average total costs of medical visits. This result is also consistent with the positive coefficient on the quality index for patients bypassing a private facility. Therefore, these bypassers appear to be motivated by higher quality and thus higher price facilities which in all likelihood are also private. Among income quintiles, we observe that patients in the poorest quintile are sensitive to price and tend to be significantly deterred by higher prices. On the other hand, prices seem not to impact the bypassing behavior of patients in the richest quintile.

Patients who choose private facilities are much more likely to have bypassed another facility. They are 5.8%, 2.5%, 0.8%, and 17.9% more likely to have bypassed a public, private, religious, and any type of facility respectively. As for patients' characteristics, the severity of the illness represented by the number of days the patients has been sick and the existence of multiple symptoms, lead to significantly higher bypassing rates.

8.3.1 Bypassing Urban vs Rural Facilities

As table 5 shows, while competition can be quite intense in urban areas, health providers in rural areas often enjoy a monopolistic position. It may then prove useful to split the sample and study bypassing behavior within each area. In table 13, we present the results for rural and urban patients, along with results for the poorest and richest income quintiles. Table 14 how bypassing specific types of providers varies between urban and rural areas. We observe that for the subjective quality assessments, expecting of a higher quality of service leads to significantly more bypassing in urban but not in rural areas. Among urban facilities, the probability that a patient bypassed other facilities to come to visit them because they sell drugs at a lower price increases by an impressive 17%. The objective quality measures also seem to have positive effects in urban but not in rural areas. Better infrastructure and more skilled personnel increase the chances the patients in an urban facility are

bypassers, whereas a higher rate of staff absenteeism decreases the probability that the patient is a bypasser.

Table 13: Income Groups Bypassing Behavior - Marginal Effects

	Urban			Rural		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	**Poorest Quintile**	**Richest Quintile**	**All**	**Poorest Quintile**	**Richest Quintile**
Household Income Quintiles						
Q1	**-0.205**			**-0.08**		
	(2.33)**			**(2.73)*****		
Q2	**-0.177**			**-0.088**		
	(2.37)**			**(3.04)*****		
Q3	-0.044			**-0.087**		
	-0.4			**(2.91)*****		
Q4	**-0.105**			**-0.093**		
	(1.81)*			**(3.66)*****		
Patients Subjective Quality Assessments						
Others don't offer service	**0.128**	**0.161**	0.182	**0.138**	-0.011	-0.106
	(2.58)***	**(2.25)****	-1.35	**(1.87)***	-0.39	-1.1
Short wait time	0.024	0.04	-0.037	0.032	0.054	0.068
	-0.36	-0.62	-0.17	-1.15	-1.45	-0.94
Close to markets	-0.033	0.06	-0.033	-0.005	-0.027	-0.065
	-0.49	-0.81	-0.2	-0.13	-0.69	-0.79
High quality service	**0.07**	0.026	-0.036	-0.012	0.042	**-0.155**
	(1.69)*	-0.27	-0.3	-0.37	-1.13	**(1.86)***
Drugs always available	-0.062	-0.199	0.08	-0.011	0.005	0.007
	-0.67	-1.17	-0.66	-0.39	-0.27	-0.06
Drugs cheaper	0.048	**0.17**	0.265	-0.018	**-0.045**	-0.053
	-0.95	**(1.95)***	-1.34	-0.65	**(1.65)***	-0.46
Objective Quality Measures						
Infrastructure (Water and Electricity)	**0.153**	**0.192**	0.155	-0.034	**-0.077**	-0.071
	(2.70)***	**(1.84)***	-1.35	-0.65	**(2.10)****	-0.42
Skilled Staff ratio	**0.037**	0.014	0.03	0.008	-0.006	0.021
	(4.73)***	-1.15	-1.51	-1.18	-0.34	-0.91
Staff absenteism	**-0.004**	**-0.01**	**-0.007**	-0.001	0	-0.001
	(3.24)***	**(3.16)*****	**(2.41)****	-0.81	-0.49	-0.32
Facility vs District costs	-0.001	0.021	-0.002	0.012	**-0.026**	0.022
	-0.43	-1.13	-0.25	-1.11	**(2.60)*****	-0.62
Facility Characteristics						
Monopoly	**-0.258**	-0.094	-0.131	**-0.21**	**-0.109**	**-0.379**
	(4.00)***	-0.75	-0.38	**(3.36)*****	**(1.72)***	**(4.35)*****
Private	**0.227**	0.131	**0.428**	**0.087**		**0.359**
	(2.67)***	-1.41	**(4.41)*****	**(2.71)*****		**(3.10)*****
Not-for-profit	0.076	**-0.177**	**0.348**	-0.006	-0.008	-0.125
	-0.98	**(2.49)****	**(6.77)*****	-0.18	-0.32	-0.85
Beds	0	0.018	-0.004	**0.002**	**0.004**	0.014
	-0.08	-1.59	-0.22	**(3.39)*****	**(3.35)*****	-1.61
Tests	-0.012	0.021	**-0.199**	**0.087**	0.117	0.087
	-0.52	-0.19	**(2.70)*****	**(2.14)****	-1.56	-0.5
External Support	**0.086**	-0.095	**0.219**	0.008	0.037	**0.181**
	(2.37)**	-0.63	**(1.76)***	-0.28	-1.43	**(2.88)*****

Patients Characteristics						
Male	0.011	-0.002	-0.034	0.011	-0.034	**0.1**
	-0.34	-0.04	-0.34	-0.43	-1.04	**(2.29)****
Age	0.001	0.001	0.002	0	0	-0.005
	-0.25	-0.96	-0.7	-0.41	-0.11	-1.38
Education	**0.031**	0.005	0.018	0.016	**0.021**	-0.005
	(2.01)**	-0.07	-1.17	-1.08	**(2.02)****	-0.11
Reason visit	-0.101	0.063	-0.092	0	-0.01	-0.092
	-1.53	-1.26	-0.56	-0.01	-0.25	-0.59
Multiple Problems	0.037	**-0.139**	0.059	**0.054**	0.027	**0.153**
	-0.64	**(2.21)****	-0.48	**(3.65)*****	-1.45	**(2.71)*****
Number of days sick	0	-0.003	0.001	**0.001**	**0.001**	0.002
	-0.05	-0.93	-0.82	**(2.71)*****	**(2.29)****	-0.76
Time to reach facility	**0**	**0**	**0.01**	0	**0**	**0.002**
	(2.63)***	**(2.41)****	**(2.74)*****	-0.39	**(2.07)****	**(2.07)****
Visited another provider	**0.209**	0.246	**0.184**	**0.068**	0.054	0.004
	(3.43)***	-1.43	**(1.73)***	**(2.33)****	-1.38	-0.04
Observations	530	110	99	805	139	170
Pseudo R-squared	0.2	0.28	0.32	0.23	0.31	0.27
Log Likelihood	-286.05	-43.85	-45.2	-257.09	-36.93	-77.24

Robust z-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 14: Bypassing by Type of Facility - Marginal Effects

	At Least One		Public		Private		Religious	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Urban	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**
Household Income Quintiles								
Q1	-0.192	-0.006	-0.064	-0.02	**-0.076**	-0.005		-0.003
	-1.51	-0.1	-0.81	-0.69	**(10.19)*** **	-0.69		-0.73
Q2	**-0.146**	**-0.111**	**-0.069**	-0.028	**-0.045**	-0.004	**-0.037**	-0.001
	(1.65)*	**(3.08)*** **	**(2.10)** **	-1.18	**(9.91)*** **	-0.53	**(14.7)*** **	-0.08
Q3	-0.048	-0.075	0.025	**-0.042**	**-0.052**	**-0.013**	0	-0.003
	-0.38	-1.27	-0.3	**(2.26)** **	**(5.81)*** **	**(2.06)** **	-0.02	-0.95
Q4	-0.107	**-0.098**	0.044	**-0.042**	**-0.029**	**-0.015**	**-0.009**	-0.006
	-1.49	**(1.84)***	-1.47	**(2.07)** **	**(1.85)***	**(2.30)** **	**(9.29)*** **	-1.39
Patients Subjective Quality Assessments								
Others don't offer service	**0.223**	0.066	0.057	**0.088**	-0.008	-0.006	0.009	-0.001
	(2.64)* **	-0.6	-0.59	**(2.06)** **	-0.69	-0.56	-1.59	-0.18
Short wait time	0.004	**0.069**	0.009	-0.014	**-0.057**	0.004	-0.005	0
	-0.05	**(1.85)***	-0.22	-0.65	**(3.12)*** **	-0.66	-1.21	-0.08
Close to markets	0.006	-0.025	-0.009	-0.02	-0.012	-0.01	-0.004	**0.005**
	-0.1	-0.87	-0.18	-0.93	-0.67	-1.36	-0.67	**(1.65)***
High quality service	0.069	**0.106**	**0.068**	0.007	**0.06**	**0.019**	-0.003	
	-1.39	**(3.33)*** **	**(1.75)***	-0.32	**(10.45)*** **	**(2.03)** **	-1.19	
Drugs always available	**-0.11**	0.092	-0.068	0.005	0.024	-0.006	-0.001	-0.001
	(1.79)*	-1.56	-1.05	-0.32	-1.05	-0.8	-0.39	-0.12
Drugs cheaper	**0.104**	**-0.071**	0.019	-0.001	-0.02	0.001	**-0.017**	**0.007**
	(2.21) **	**(2.14)** **	-0.38	-0.06	-1.16	-0.18	**(4.58)*** **	**(4.23)*** **
Objective Quality Measures								
Infrastructure (Water and Electricity)	**0.173**	0.014	-0.022	0.032	**0.059**	-0.001	0.003	
	(2.41) **	-0.17	-0.77	-0.92	**(2.28)** **	-0.07	-0.57	
Skilled Staff ratio	**0.035**	0.003	**0.028**	-0.001	**0.008**	0	0	-0.002
	(3.30)* **	-0.39	**(6.55)*** **	-0.1	**(2.69)*** **	-0.18	-0.07	-0.58
Staff absenteism	**-0.006**	**-0.002**	**-0.004**	-0.001	**-0.001**	0	0	0
	(4.10)* **	(2.21)**	**(5.67)*** **	-1.09	**(3.08)*** **	-0.24	-1.13	-1.62
Facility vs District costs	-0.001	-0.018	0.001	0.007	0.002	-0.002	0	**-0.007**
	-0.48	-1.12	-0.46	-0.69	-1.55	-0.34	-1.03	**(2.51)** **
Facility Characteristics								
Monopoly	**-0.243**	**-0.21**	**-0.13**	-0.042	-0.043	**-0.039**		0.007
	(2.30) **	**(4.27)*** **	**(3.12)*** **	-1.39	-1.14	**(2.31)** **		-1.58
Private	**0.189**	**0.23**	**0.179**	0.007	0.056	0.01	**0.015**	0.049
	(2.18) **	**(4.84)*** **	**(3.47)*** **	-0.25	-1.18	-0.94	**(2.26)** **	-1.61
Not-for-profit	0.074	0.05	0.113	0.025	-0.025	-0.01	**0.007**	-0.002
	-1.39	-0.86	-1.26	-0.86	-1.48	-1.32	**(1.86)***	-0.27
Beds	-0.002	**0.002**	0.003	0	0	0	0	**0.001**
	-0.41	**(3.63)*** **	-1.09	-0.84	-0.12	-1.38	-0.11	**(3.75)*** **
Tests	-0.022	0.08	0.01	0.003	-0.023	0.012	**-0.006**	**0.034**
	-1.01	-1.25	-0.37	-0.14	-1.3	-0.59	**(2.37)** **	**(1.97)** **
External Support	**0.087**	**0.054**	**0.064**	-0.012	**0.099**	0.002	0.007	
	(2.72)* **	**(1.67)***	**(1.69)***	-1.01	**(5.42)*** **	-0.19	-1.57	

Patients Characteristics								
Male	-0.021	0.022	-0.031	0.016	**0.031**	0.002	-0.001	-0.009
	-0.59	-0.66	-1.11	-0.81	**(1.79)***	-0.22	-0.25	-1.27
Age	0	-0.002	0.002	0	0	0	0	**0**
	-0.04	-1.4	-1.64	-0.12	-0.09	-0.51	-0.29	**(1.76)***
Education	**0.035**	**0.065**	0.002	0.002	**0.019**	0.003	0	0.001
	(1.80)*	**(2.24)****	-0.2	-0.16	**(3.78)*****	-0.73	-0.53	-0.63
Reason visit	-0.085	-0.011	-0.007	0.01	**-0.081**	-0.005	-0.011	0.004
	-1.13	-0.41	-0.15	-0.71	**(2.86)*****	-0.8	(1.94)*	-0.8
Multiple Problems	0.014	0.036	-0.019	0.016	**0.034**	**0.013**	0.002	0.002
	-0.32	-1.19	-0.51	-1.2	**(1.85)***	**(2.09)****	-0.68	-0.52
Number of days sick	-0.001	0	-0.001	**0.001**	0	0	**-0.001**	**0**
	-0.42	-0.41	-0.79	**(3.41)*****	-1.48	-1.53	**(5.01)*****	**(3.03)*****
Time to reach facility	**0**	0	**0**	0	**0**	0	**0**	0
	(5.31)***	-1.24	**(3.22)*****	-0.18	**(3.75)*****	-1.31	**(23.1)*****	-1.19
Visited another provider	**0.249**	**0.284**	**0.109**	**0.043**	**0.042**	0.017	0	0.006
	(3.13)***	**(7.51)*****	**(2.66)*****	**(2.42)****	**(3.79)*****	-1.45	-0.02	-1.59
Observations	530	805	530	805	530	805	405	379
Pseudo R-squared	0.2	0.18	0.17	0.15	0.27	0.2	0.25	0.25
Log Likelihood	-293.32	-403.14	-240.58	-174.11	-148.65	-89.21	-62.02	-34.82

Robust z-statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Bypassing in rural areas does not seem to react to medical staff size or absenteeism. Indeed, the rural poorest tend to bypass facilities in order to go to lower quality level facilities and lower price providers. This is confirmed by the negative and significant coefficients on basic infrastructure and on the price differential between the facility they attend and the average facility in the district.

Table 14 which shows the bypassing patterns of specific types of providers mirrors table 13. Bypassing a private urban provider implies seeking a provider with better infrastructure, and more and better medical personnel. Expectation of a higher quality of service leads to an increase of 6% and 1.9% in the likelihood that the patient has skipped a private provider. The results obtained for rural areas probably reflect the fact that many rural facilities are monopolies and therefore rural patients do not have a choice.

Finally, comparing table 13 and 14 to table 12 of the entire sample makes clear that bypassing is an urban phenomenon in Chad. Indeed, table 12 shows that among people who seek care in a private facility, overall, there is a significant increase of 5.8% that they have bypassed a public facility. This is mostly driven by bypassing behavior in urban areas. Indeed, in table 14 the same coefficient is not

significant in rural areas, whereas in urban areas the probability is 17.9% higher that patients who seek care in a private facility have bypassed a nearer public facility.

9 Conclusion

Bypassing reflects the search for health services perceived as better adapted to a patient's needs, along with willingness and ability to pay for care. Bypassing of health centers in the choice of a health provider is an important manifestation of consumer power. This paper has shown it to be significant in Chad, a country with little developed health infrastructure and weak competition. Bypassing is particularly intensive in urban areas --especially in N'Djamena, the capital city-- with a strong supply of health care services. Rural patients also engage in bypassing, but to a much smaller extent. For the most part, patients seek better and more adapted services and are willing to invest substantial time and travel cost and pay higher service costs to obtain those higher quality services. Not surprisingly, higher-income patients wield more consumer power by bypassing more. The article unveiled a second type of bypassing behavior, practiced mainly by poorer individuals who bypass facilities to seek care from a less expensive provider. This cost reduction pattern of bypassing is mainly practiced by the lowest income quintile, especially in rural areas, and is associated with a choice of facility which provides significantly lower objective quality of care. Hence, contrary to Akin and Hutchinson (1999) results in Sri Lanka, we find in Chad that patients are sensitive to service prices and that medical expenditure affects choice of facilities.

The fact that bypassing is mainly an urban phenomenon poses a serious question in the allocation of public health resources between urban and rural areas. While rural facilities are often overcrowded despite their low quality, urban public facilities are underutilized given that they are generally bypassed to the benefit of private providers. Rural patients barely can exercise choice and are restricted to using the local, poor quality, monopolistic facility in the village. Should the government reallocate part of the resources devoted to urban public facilities toward rural facilities that could therefore provide a better quality of care to their captive market? Because of the rise of urban poverty, this reallocation also involves a trade-

off between increasing quality of care in the rural areas to the detriment of urban areas. Ultimately, a reallocation of public funds will have to be carefully done and monitored to ensure that additional public resources do reach rural facilities, especially in Chad where leakage of public funds has been shown to be quite substantial (see Gauthier and Wane, 2007).

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Appendix

Table A1: Characteristics of patients of the 1st and 5th revenue quintiles

	1st Quintile	5th Quintile
Average Revenue (FCFA)	4 884	190 211
Age (years)	28,6	31,5
Women (%)	67	46
Scolarised (%)	8,3	45,2
Rural (%)	79,9	41,3
Work (%)	9,1	57,9
Electricity (%)	4,8	26,6
Water (%)	11,5	47,6
Toilet (%)	4,0	30,2
Number of observations	*252*	*252*

Table A2: Descriptive Statistics

Variable	n	Mean	S.D.	Mdn
Others don't offer service	1795	0.1	0.3	0
Short wait time	1795	0.51	0.5	1
Close to markets	1795	0.36	0.48	0
High quality service	1795	0.69	0.46	1
Drugs always available	1795	0.61	0.49	1
Drugs cheaper	1795	0.72	0.45	1
Rural	1801	0.61	0.49	1
Monopoly	1801	0.5	0.5	1
Private	1801	0.13	0.33	0
Not for profit	1801	0.2	0.4	0
Test	1790	0.1	0.3	0
Beds	1801	2.98	9.73	1
Mean Price	1801	-0.44	2.96	-0.51
Men	1794	0.47	0.5	0
Age	1796	30.32	11.32	28
Education	1775	0.73	0.94	0
Number of problems	1801	0.36	0.48	0
Number of days sick	1476	12	18.76	5
Travel time to health center	1766	68.45	271.31	20
Prior visits	1801	0.2	0.4	0